

REMARKS

Responsive to the outstanding Office Action, applicant has carefully studied the Examiner's rejections and the comments relative thereto. Favorable reconsideration of the application is respectfully requested in light of the amendments and following detailed arguments.

In the amendment, claims 16, 18, 22, 24 and 26-28 were amended. It is submitted that no new matter has been entered into the claims through these amendments.

REJECTIONS UNDER 35 USC §112, second

The Examiner rejected claims 16-28 and 31-33 under 35 USC 112, second paragraph, for indefiniteness.

Claims 16 and 22 have been amended herein to clearly place the "polymer substrate" in the singular. References to multiple substrates or "at least one" substrate have been removed so that the singular is consistent.

Further, claim 16 has been rewritten in such a manner that there is a definite linkage between the polymer substrate of the preamble and the polymer substrate listed late in the claim. Therefore there is no longer a question as to whether these are actually linked. Additionally, the claims have been amended to attempt to be more consistent throughout.

In view of the above, reconsideration and withdrawal of the rejections under 35 USC 112, second paragraph are respectfully requested.

REJECTIONS UNDER 35 USC §103

The Examiner again rejected claims 16-28 and 31-33 under 35 USC 103 as being unpatentable over Taniguchi et al. The Examiner states that Tanaguchi teaches making shaped or coated articles, that may be optical particles, using a mixture of fine inorganic particles in a matrix material that may be polymeric compounds. The Examiner acknowledges that Tanaguchi does not disclose information on energies of the ions as they impinge on the substrate or discuss the presence of a refractive index

gradient nor the wavelengths involved in the total luminous transmittance measurements. The Examiner states, however, that these numbers would have been obvious to one of ordinary skill in the art.

Claim 16, as amended, defines a process for reducing the surface reflectance of polymer substrates to less than 2% in the wavelength range from 400 nm to 1100 nm. A refractive index gradient layer is formed by means of ion bombardment using high-energy ions which are generated by means of an argon and oxygen plasma as plasma ion source. The ions impacting at least one substrate surface during the ion bombardment have an energy of from 100 eV to 160 eV, and the duration of the ion bombardment is from 200 to 600 s, and the ion bombardment is carried out until a refractive index gradient layer with a thickness of at least 230 nm has been formed.

The present invention involves directly impacting the surface of a polymer substrate with ions under conditions mentioned in independent claim 16. The disclosure of Taniguchi addresses a process for producing transparent shaped articles with enhanced anti-reflecting effect. The treatment with an activated gas forms an anti-reflective thin film on a surface of an optical transparent article. The film formed thereby contains finely divided particles of an inorganic substance. These particles have an average particle size in the range 1 to about 300 milli-microns (as reflected in claim 1).

The present invention, as defined in claim 16, discloses the direct ion bombardment onto the surface of a substrate comprising a polymer material. There is no suggestion or disclosure of a coated substrate or one that would be applied with an additional coating. The substrate surface itself is subject to the ion bombardment. It is respectfully submitted that this bombardment of the substrate itself, made from a polymer without any other materials is a significant feature of the present invention.

Newly presented claim 34 further defines that the substrate itself is directly bombarded by the ions, and that the gradient layer is formed as a portion of the substrate itself. It is believed that independent claim 34 thus clarifies the subject matter being defined herein.

Taniguchi defines a composite made of two different materials. This requires an additional coating on the surface of the substrate. This coating is the surface layer which influences the optical properties of the finished product. Polymeric and inorganic materials are known to have greatly differing properties, not limited to but including optical properties. Similarly, conditions for the treatment of polymeric and inorganic materials differ greatly. One skilled in the art would recognize that inorganic materials would not be affected as desired by using energies in the ranges defined in claim 16, i.e. 100eV to 160eV from 200 to 600s.

The taniguchi reference discloses a multi-step process. An organic binder containing inorganic particles is wet chemical applied onto the surface of a substrate. Subsequently, the organic binder is removed partially by a plasma etching process. Thus the surface of the substrate is essentially formed from the inorganic particles after this treatment. This process would not be suitable for structured surfaces such as Fresnel lenses. The applied mixture would be filling uneven areas and as acknowledged by Taniguchi (table 1) the achievable transmittance would be less than 98%.

It is clear from the above that Taniguchi describes a very different process from that claimed in the present invention. One skilled in the art would not look at Taniguchi for a process not involving an additional coating layer, and even if one did one would not derive the present invention as taught in claim 16.

It is therefore submitted that claim 16, and the claims dependent therefrom, are allowable over the applied art of record. Similarly, claim 34, which further emphasizes features of claim 16 is likewise allowable over the applied art of record.

DOUBLE PATENTING

Claims 16-28 and 31-33 were also provisionally rejected under the doctrine of non-statutory obviousness-type double patenting as being unpatentable over claims 1-7, 12-18 and 24-25 of copending application 11/662,550.

The present invention has an earlier filing date than that of the copending referenced application, and also an earlier priority date. Therefore, even if a double patenting rejection were warranted it is respectfully submitted that the present

application would have the superior date and a terminal disclaimer would not be warranted herein.

However, copending Application 11/662,550 is drawn to a method for forming an optical element for absorbing radiation. This is illustrated in claim 1 of the copending application which claims "a method for the manufacture of a radiation-absorbing optical element that includes a substrate of plastic, comprising the steps of: forming a layer with a graduated refractive index on at least one surface of the substrate, and subsequently applying a metal layer onto the layer with the graduated refractive index."

This is in contrast to the present method for reducing the surface reflectance of an optical element which is formed according to the claimed present invention, requiring argon and oxygen as opposed to a metal. The coating materials are different as are the process steps involved. Further, the metal layer of the copending application could not form a refractive index gradient layer. The refractive index of such a layer would be constant.

Therefore, the subject matter of the claimed inventions in these two applications are only tangentially related and should not be subject to a double patenting rejection.

It is therefore believed that independent claim 16 distinguishes over the applied art of record and is not subject to a double patenting rejection.

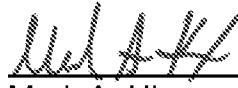
If the Examiner chooses to hold the double patenting rejection applicant holds any further response in abeyance until the provisional nature of the double patenting rejection is removed.

SUMMARY

In view of the forgoing, independent claim 16 is believed to be allowable over the applied art of record, and action towards that end is respectfully requested. Claims 17-28 and 31-33, which depend directly or indirectly from independent claim 16 are believed to be allowable based, at least, upon this dependence.

Should the Examiner wish to modify the application in any way, applicant's attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,



Mark A. Hixon
Registration No. 44,766

ATTORNEYS

Marshall & Melhorn, LLC
Four SeaGate - 8th Floor
Toledo, Ohio 43604
(419) 249-7114
(419) 249-7151 Facsimile
HIXON@MARSHALL-MELHORN.COM